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*Inventory of Placer Mining Effects on  
Stream Resources in the Vicinity of the  
Helena National Forest*

Glenn R. Phillips

and

Ann B. Humphrey

January, 1987

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Stream Resources in the Vicinity of the  
Helena National Forest

by

Glenn R. Phillips  
and  
Ann B. Humphrey

Pollution Control Information Series  
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## ACKNOWLEDGEMENT

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## INTRODUCTION

Placer gold was first discovered in Montana in 1852 (Lyden 1948) -- between 1900 and 1946 over 27 million dollars worth of placer gold was recovered. On the national level Montana ranks third in gold production behind California and Alaska; approximately half of Montana's gold has been recovered from placer deposits.

Many of the streams and gulches in the Helena area were extremely productive and placer mining here boomed in the mid-1860's. The boom lasted for about 5 years although considerable placer activity continued until the mid-1880's. Lesser amounts of placer mining continues today with the extent largely determined by the price of gold.

### The Placer Mining Process

Placer gold originates from mineral deposits that have been displaced from bedrock by forces of weather and erosion. Placer gold occurs as nuggets, flakes or dust that are mixed with stream gravels -- usually in depositional areas. The basic placer mining process includes excavation of the gold bearing gravels and some method of sorting and separation. Recovery takes advantage of the fact that gold has a higher density than the alluvial gravels and sands.

The most familiar method of placer mining is panning. However, most commercial operations employ mechanized equipment for digging, sorting and stacking placer gravels. Equipment used in the larger operations include backhoes, front-end loaders, and draglines.



Two methods of placer mining no longer commonly used in Montana include drift mining and hydraulic mining. Drift mining requires digging tunnels in the alluvium; efficient excavation machinery have for the most part replaced this method. Hydraulic mining consisted of pumping water through large hoses and washing away and processing the alluvial deposits that were believed to contain gold. This method is no longer used because of the negative impacts on streams and water quality.

Sorting of gravels and recovery of gold is usually accomplished using some combination of sluice boxes, trommels, and screens. Sluice boxes are long troughs with ridges along the bottom to catch the heavier gold particles as the gravels are washed away. Trommels are large, cylindrical sieves which rotate, separating the larger gravels and channeling the finer materials into the sluice box for further processing. Historically, mercury was mixed with the fines to amalgamate the gold. Although modern miners are probably more careful at containing mercury than their early day counterparts, mercury has been found in the alluvium at some Montana placer sites.

### Impacts of Placer Mining on Streams

Most placer mining occurs in either historic or existing streambeds, consequently fishery resources may be affected by this type of mining. Damage may result from physical alterations to the stream channel, removal of riparian vegetation, or from sediment entering the stream. Settling ponds are usually used by placer miners to reduce the turbidity of mine process waters. However, poorly constructed or improperly located ponds may themselves pose a threat to stream



fisheries. Additionally, unreclaimed mine sites located within the floodplain of streams can result in increased erosion and turbidity for many years after mining is completed.

The objectives of this survey of placer mining activities in the vicinity of the Helena National Forest were to evaluate whether placer mining, either historic or contemporary, have had a significant impact on fishery resources in the study area. During the project we spoke with individuals representing agencies of state, federal, and local government that have authority to regulate the various activities undertaken by placer miners. Consequently we have also taken the opportunity to review the regulatory process and the ability of the existing regulatory framework to protect fishery resources.



## METHODS

Locations of placer mines on the Helena National Forest were determined from several sources. The Water Quality Bureau began to map active placer sites in western Montana several years ago (Pedersen 1982). Further information on the location of active placer mines was gathered from the Water Quality Bureau's discharge permit list, from minerals personnel at the three ranger districts of the Helena National Forest (Helena, Lincoln, Townsend), and from the Butte office of the Bureau of Land Management. Finally, information was obtained from three Soil Conservation Districts including those in Broadwater, Jefferson, and Meagher Counties.

We found records of over 70 proposed placer mines, however, many of these had never operated. Twenty-two active mines and 37 streams were visited on the ground between 8 July and 8 August 1986. Additionally, many of the sites and drainages were viewed and photographed from the air (helicopter) on 30 July. At each site a variety of information was collected including the distance of the operation from surface water, whether a surface water diversion or discharge to the stream were present, the presence and condition of settling ponds, estimated stream flow and stream type, and the length of the affected reach.

Qualitative observations were also recorded as to the condition of the stream and the extent of old placer remains (if any) and photographs were taken. Finally, historical information and fishery data were summarized for each stream and a judgement was made as to the significance of both historic and present day placer mining on the fishery resources of the stream. Information on past



placer activities was taken primarily from Gold Placers of Montana (Lyden 1948) and Montana Pay Dirt (Wolle 1963). Fishery data and fish habitat information were summarized from the Montana Interagency Stream Data Base.

Fish numbers in streams where surveys have been conducted were judged to be abundant, common, uncommon, or rare according to the criteria established for and used in the Montana Interagency Stream Data Base. The indices of abundance vary depending on the width of the stream, i.e., a wider stream requires more fish per unit of length to qualify for a given abundance category.



## RESULTS

### Placer Mines in the Big Belt Mountains

Streams inventoried in the Big Belt Mountains are shown in Figure 1.

#### Avalanche Gulch

Prior to 1884 rich placer gold deposits were recovered from a bench on the west side of Avalanche Creek near Thompson Gulch (approximately 13 miles upstream from the mouth); the deposit was worked one mile upstream and one mile downstream of Thompson Gulch. No gold recovery was recorded after 1904 (Lyden 1948).

Nearly the entire stream from Canyon Ferry road upstream approximately 14 miles to Cooney Gulch was examined on 8 July, 1986. A small amount of historic placer disturbance was observed in a three mile stretch near the middle of the stream (Photo 1) as well as along the west side of Thompson Gulch. One existing operation was present near Thompson Creek and consisted of a small trommel and backhoe. The miner was not operating at the time of our inspection but it appeared that the discharge from the wash operation would enter the stream (Photo 2). Water Quality Bureau files indicate that the miner did not have a discharge permit.

Fishery data and fish habitat information on Avalanche Gulch were collected by the Montana Department of Fish, Wildlife and Parks (MDFWP) during 1978 and 1986



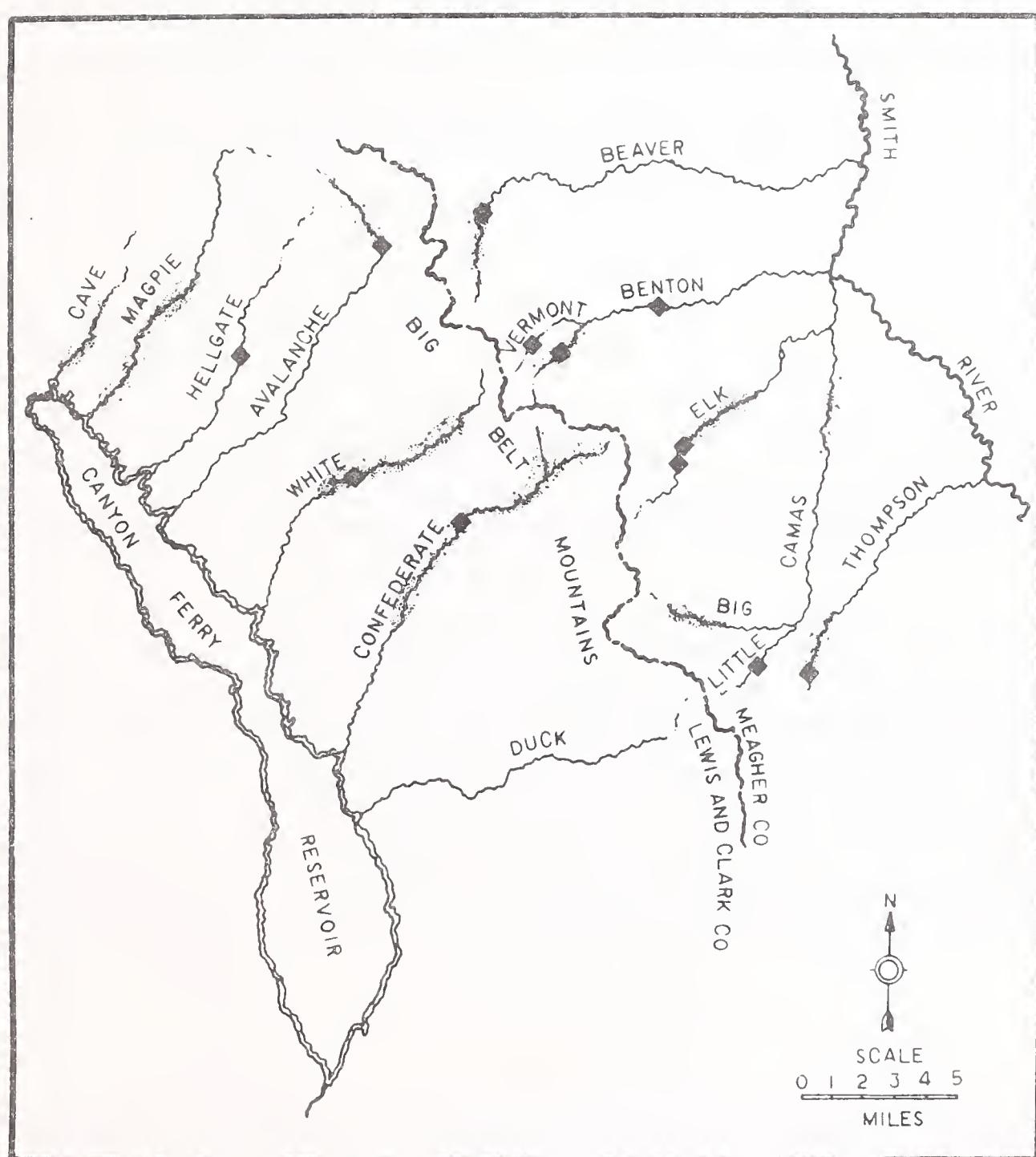


Figure 1. Streams in the Big Belt Mountains examined during this placer mining survey. Dark Squares indicate existing placer operations; shaded stream reaches showed evidence of historic placer mining.



and by the U.S. Forest Service in 1979. Fish were absent from the lower 3.2 miles of stream during 1978 (from the mouth to the Forest Service boundary). Habitat in that reach was deteriorated due to lack of both overhanging cover and undercut banks, and stream dewatering for agriculture. From the Forest Service boundary upstream for 2.9 miles (1978) mottled sculpin and rainbow-cutthroat hybrids were relatively common (57/300 m). However, habitat remained in poor condition due to lack of both overhanging cover and undercut banks, and stream channel alterations caused primarily by historic placer dredging.

#### Beaver Creek

Placer mining occurred intermittently in Beaver Creek between 1904 and 1942 using primarily small scale sluice boxes and other hand methods (Lyden 1948).

We examined the upper reach from the headwaters downstream 0.9 miles to the private land boundary on 15 July 1986. Several small dredge piles from past placer activity were observed along the streambank in the upper half of this reach. One small operator was working a half acre plot with a backhoe on a bench above the stream however, this operation was not affecting the stream (Photo 3).

The MDFWP collected fishery data and fish habitat information on the lower reach of Beaver Creek from the mouth upstream for 6.6 miles in 1977. In 1979 the U.S. Forest Service collected fish habitat information on the upper reach, from the headwaters downstream 0.9 miles to the private land boundary. In the lower reach brook trout were common (23/300 m). Habitat was judged to be deteriorated due to excessive flow fluctuations, siltation and stream dewatering for



agriculture. Historic mining and overuse by livestock were additional factors limiting the fishery.

Fish habitat in the upper reach (from the headwaters to private land) was also deteriorated but not due to mining. Limiting factors included excessive flow fluctuations, bedload movements, a highly erosive drainage, and a lack of undercut banks.

### Benton Gulch

Historically, gold mining in Benton Gulch was small scale and occurred intermittently. A dry-land dredge operated for a few months in 1928 but sluicing was the primary method of mining (Lyden 1948).

We visited Benton gulch on the 9 and 15 July 1986 and inspected the stream from Stroyanoff Lake upstream 6.5 miles to near the headwaters. Between Benton Gulch and Ohio Gulch (two miles downstream) the stream has been substantially altered due to past mining. In some sections dredge material has filled in the stream channel and streambank vegetation has been destroyed. Historic dredge piles are present along the streambank (Photo 4).

Two operations are presently working upper Benton Gulch. A small hand operation is located downstream of Ohio Gulch and is set up to discharge into the stream (no one was working during our visit). A slightly larger operation (about 0.5 acre) is located above the Cement Gulch road (Photo 5) that includes a closed settling pond system. The pond was well constructed and located away from the influence of the creek.



The MDFWP collected fishery data and fish habitat information on Benton Gulch in 1977. The inventory was conducted from the mouth upstream 8.7 miles to Vermont Gulch. There were 47 trout per 300 m in this reach; rainbow and brook trout were abundant while cutthroat trout were uncommon. At the time of the survey, fish habitat was judged to be deteriorated. Past dredging has altered the stream channel, however, impacts to the stream from present mining activities are relatively minimal.

### Cave Gulch

Placer gold was first mined in Cave Gulch in 1866 (Lyden 1948) and the lower reaches have been hydraulically mined. Mining was very productive through 1894 and a town and trade center developed near the mouth (Wolle 1963). There are no records of placer activity between 1904 and 1936 but the upper reaches were mined as late as 1938 (Lyden 1948).

We examined the lower one mile of stream on 8 July 1986. Old placer spoils were observed along the entire lower reach; however, the stream was dry and no active placer operations were present.

The U.S. Forest Service collected fish habitat information in the upper reaches of Cave Gulch in 1979. The inventory began at the National Forest boundary and extended 5.5 miles upstream (the National Forest boundary is 0.5 mile from the mouth). At the time of the survey the fishery was judged to be limited primarily by natural factors. Lack of spawning habitat, inadequate pools and excessive flow fluctuations were all listed as important. Although mining has damaged the stream, it is unlikely that the stream ever supported a significant fishery.



### Cement Gulch

Confederate Gulch, including the headwater tributaries of Cement Gulch, Montana Gulch and Boulder Creek, was the greatest gold producer in Broadwater County and among the greatest in the state (Lyden 1948). Records indicate that by 1946 Cement Gulch had been mined for a distance of 8,000 feet or more.

On 9 July 1986 we inspected Cement Gulch from the mouth upstream approximately two miles to near the headwaters. Evidence of historic placer mining included old dredge piles, some located in the stream channel, causing the creek to intermittently go underground. One small operation was observed near the creek. However, present placer mining impacts are minimal compared to historic activities.

The U.S. Forest Service collected fish habitat information on the lower half of Cement Gulch (from the mouth upstream for 0.7 miles) in 1979. The stream was judged to be poor for spawning, below average for rearing, and average for fish residence. Mining was judged to have had some impact on the fishery along with such natural factors as excessive flow fluctuations, bedload movement, and a highly erosive drainage. The stream probably never supported a significant fishery.

### Confederate Gulch

Confederate Gulch produced some of the richest placer gold discoveries in Montana (Lyden 1948). Gold was first discovered in the drainage in 1864 and gold production boomed through the 60's. Montana Bar, near the mouth of Montana



Gulch, was the richest area in the drainage and attracted thousands of miners to the Diamond City mining camp. Early miners built a ditch to bring water from the upper reaches of Confederate Gulch down to the Montana Bar sluicing operation. By 1866 the bar was stripped nearly to bedrock and mining efforts moved elsewhere in the gulch. Another huge ditch was constructed to bring water from Boulder Creek to a site one mile upstream of Diamond City. This ditch, built with hand tools, took two years to construct; it was 4.5 miles long, 5 feet wide and 2.5 feet deep. This water was used primarily for hydraulic mining on the Diamond Bar, where fourteen 2.5 inch nozzles sprayed water "day and night washing away the loam of the streambanks" (Lyden 1948). Gold production began declining in the early 70's; and by 1883 Diamond City was deserted (Wolle 1963). However, placer mining, including some large scale efforts, continued through 1940. In 1939 a single dragline dredge processed 600,000 cubic yards of gravel and in 1940 processed 170,000 cubic yards. Overall, about five miles of the stream have been extensively placered (Lyden 1948).

We examined the upper eight miles of stream (from Canyon Ferry Road to Cement Gulch) on 9 July 1986. Immense rows of tailings from past mining remain along the stream, some as large as 10 feet high, a quarter mile long and 150 feet wide (Photos 6-7). A small recreational operation was observed near the confluence of Boulder Creek. This operation was not significantly affecting the stream.

The MDFWP collected fishery data and fish habitat information on Confederate Gulch between the mouth and Cement Gulch in 1981, 1985 and 1986. The U.S. Forest Service collected fish habitat information on the upper reach between the National Forest boundary and Cement Gulch in 1979. Between the mouth and the Canyon Ferry road (4.3 miles) no fish were present in 1986 primarily because of



stream dewatering for agriculture. Above the Canyon Ferry road to the National Forest boundary (5.3 miles) brook trout were abundant, and cutthroat trout and mottled sculpin were common. In 1981 the reach above the National Forest boundary to Cement Gulch (2.7 miles) brook trout were common (22/300 m) and rainbow-cutthroat hybrids (10/300 m) were uncommon. There was evidence of extensive historic dredging in the uppermost reach. The stream has stabilized somewhat from past mining alterations but recovery is unlikely without extensive reclamation efforts. Impacts from present mining activities are relatively negligible compared to historic damage. Bank encroachment and channel alterations from past mining activities continue to limit the fishery.

### Elk Creek

Historic records indicate that placer activity occurred in Elk Creek prior to 1904 (Lyden 1948). We examined the reach upstream from Doggett Reservoir both on the ground and from the air on 15 and 30 July 1986, respectively. Evidence of extensive historic dredging was observed on a bench on the east side of the creek.

Two placer operators were working in Elk Creek near the National Forest boundary (approximately 4.5 miles upstream from the reservoir). The downstream most operation (Photo 9) had disturbed approximately one acre near the creek and included two small settling ponds; the creek was largely unaltered. The upstream operation was not examined closely due to access problems but was observed from the air (Photo 8). The working area included settling ponds, a surface water diversion and heavy equipment. The disturbed area was adjacent to the stream and may be larger than five acres in size. According to records



provided by the Department of State Lands the miner does not presently have an operating permit.

The MDFWP collected fishery data and fish habitat information on Elk Creek in 1977, before the existing placer mines were operating. The inventoried reach began at the mouth and extended upstream 6.6 miles to just below the active mining operations. There were 23 trout per 300 m in this stretch; brook trout were common while rainbow trout were uncommon. Present mining activity has caused significant alterations to the stream channel and is having a negative impact on fish habitat.

#### Hellgate Creek

In the late 1860's and early 1870's small amounts of placer gold were recovered near the mouth of Hellgate Creek and from a reach approximately 2.5 miles upstream (Wolle 1963). We examined 5 miles of stream upstream from Canyon Ferry Road on 8 August 1986. Historic tailings were observed along the creek beginning at the Forest Service boundary (2.5 miles from mouth) and continuing upstream about two miles. According to Forest Service personnel, there is an existing placer operation about three miles upstream from the Canyon Ferry road. However, we saw no evidence that this operation is presently working.

The MDFWP collected fishery data and fish habitat information on Hellgate Gulch in 1979. The inventoried reach began at the National Forest boundary, approximately 2.5 miles from the mouth, and extended 7.1 miles upstream to the headwaters. Fish habitat was judged to be below average to average. Excessive flow fluctuations and a fish migration barrier (a culvert) were limiting the fishery



in the upper reaches and low summer streamflows prevented establishment of a fishery in the lower reaches. Although the channel of Hellgate Creek has been severely damaged from historic mining, other factors are also contributing to the reduced fishery.

#### Little Camas Creek

No written records were found of historic mining activity in the Little Camas Creek drainage. However, during our inspection of the upper 1.5 miles of stream on 5 August 1986 we observed dredge piles in the lower 0.5 mile reach (Photo 10). These had been revegetated with trees 15-20 feet tall. There was also evidence that this stretch of the stream had been diverted and straightened historically.

A miner observed working historic dredge piles during our visit (Photo 11) had disturbed about 50 yards of riparian habitat. Wash water for the operation was being diverted from the stream and two settling ponds were in use.

In 1979 the U.S. Forest Service inventoried fish habitat in Little Camas Creek from the National Forest boundary upstream for 3.8 miles. Factors listed as limiting the fishery included water temperature, inadequate pools and riffles, steep gradient, excessive flow fluctuations, and a highly erosive geology. We concluded from our inspection that stream channel alterations from historic and on-going mining activities are also having a negative impact on the fishery.



### Magpie Creek

Placer gold mining by dredging and tunneling were productive in Magpie Creek in the early 1900's; some deposits were successfully recovered as late as 1928 (Lyden 1948).

We examined the entire drainage on 8 July 1986 from near the mouth upstream for approximately 7.5 miles to the headwaters. Historic dredge piles were present along a one mile reach of stream. Many of these had revegetated while others were bare. No active placer operations were seen in the drainage.

The MDFWP collected fishery data and fish habitat information on the lower half of Magpie Creek in 1978. The inventoried reach began at the mouth and extended 4.4 miles upstream to Collins Gulch. From the mouth to the National Forest boundary (1.5 miles) cutthroat and brook trout were common. Above the National Forest boundary brook trout were common but cutthroat trout were uncommon. The upper segment supported 12 trout per 300 m. Habitat throughout the stream was deteriorated due to extreme flow fluctuations. Channel alterations caused by historic mining have also degraded habitat in some reaches. Portions of the stream are ephemeral and consequently cannot support a year around fishery. Historic mining has degraded habitat in some reaches; however, other reaches are in relatively good condition.

### Thompson Gulch

Gold was discovered in Thompson Gulch in 1865 but the claim was only moderately productive (Lyden 1948). Placer mining occurred through 1870 and again in the



1940's; a small lode mine also operated in the headwaters. We examined a one mile reach of Thompson Creek (on an east fork tributary) approximately 10.5 miles upstream from the mouth on 5 August 1986. The stream has been altered by historic dredging and includes several unreclaimed diversion channels. The streambed is lined with small dredge piles which have been revegetated with small trees.

A small placer operation working just upstream of the road to the Thompson Gulch ranger station has severely degraded stream habitat. The operator bulldozed a 30 foot section of stream removing riparian vegetation and burying the original channel (Photos 12-13). A settling pond constructed adjacent to the stream had breached releasing mud into the stream channel (Photo 14).

The MDFWP collected fishery data and fish habitat information on Thompson Creek in 1977. The reach inventoried began at the mouth and extended upstream 10.1 miles to the National Forest boundary. There were 23 trout per 300 m of stream; brook trout were common and cutthroat trout were uncommon. Fish habitat in the stream is deteriorated largely due to bank disturbances and siltation from past and present placer mining.

#### Vermont Gulch

We were unable to find written records of historic mining activity in Vermont Gulch. The headwaters area of the stream was visited on 8 August 1986. A small active mine was found near the headwaters. The operator was not working in the streambed but was using heavy equipment to work an area located 20-150 ft from the stream. The entire disturbance was about 100 yards long and 50 yards wide



and the operator was reclaiming the area as he moved downstream. A small pond had been built in the stream to facilitate pumping to a closed settling pond system which did not require a discharge. Impacts to the stream by this operation were negligible and the stream was in good condition. No fishery information was available for Vermont Gulch. However, mining was not a significant factor with respect to fishery habitat in the stream.

#### White Gulch

Gold was first discovered in White Gulch in 1865 (Lyden 1948). Placer mining in Johnny Gulch (a tributary to White Gulch) and in the mainstem of White Gulch continued for approximately 20 years. At one time White Gulch supported a mining camp (White City) of over 1,000 people. The placer gold in this gulch came from Miller Mountain, which is located at the head of Johnny Gulch; by 1946 both Johnny Gulch and the mainstem of White Gulch had each been mined for more than one mile.

We examined White Gulch on 9 July and 5 August, 1986 from the National Forest boundary to near the headwaters. Historic placer activity was evident along the White Gulch streambed for 3 miles downstream of Johnny Gulch (Photo 15); most of the dredge piles have been thickly vegetated. A small hand operator was working at the mouth of Miller Gulch on 9 July. By 5 August he had a backhoe and was building a road to accommodate additional equipment (Photos 16-17).

The U.S. Forest service collected fish habitat information on White Gulch in 1979 from the National Forest boundary upstream for 5.6 miles. Habitat for



trout spawning, rearing and residence was considered below average in the lower reach (for 2.9 miles above the Forest boundary) and average in the upper reach. Fish barriers, some presumably a result of mining, were limiting the fishery as were natural factors that included inadequate pools and the erosiveness of the drainage. Historic mining has severely impacted the fishery in White Gulch.

### Placer Mines in the Elkhorn Mountains

Streams inventoried in the Elkhorn Mountains are shown in Figure 2.

#### Crow Creek

The only important historic placer discovery in Crow Creek occurred in 1866 and was in the lower reaches north of Radersburg (Lyden 1948). Forest Service personnel indicated that placer deposits were also mined upstream of Crow Creek Falls but that the 1981 flood destroyed all evidence of past mining.

We examined a middle reach of Crow Creek on 21 July 1986 from Crow Creek Falls downstream for 1.5 miles. An abandoned and unreclaimed placer mine is present at the base of Crow Creek Falls (Photos 18-20). A variety of equipment is present at the site including trailers, a sluice box, a dragline, and a bulldozer. Several roads have been built into the hillside and a diversion, which bypassed water around the falls during mining has been tunneled through the rock.



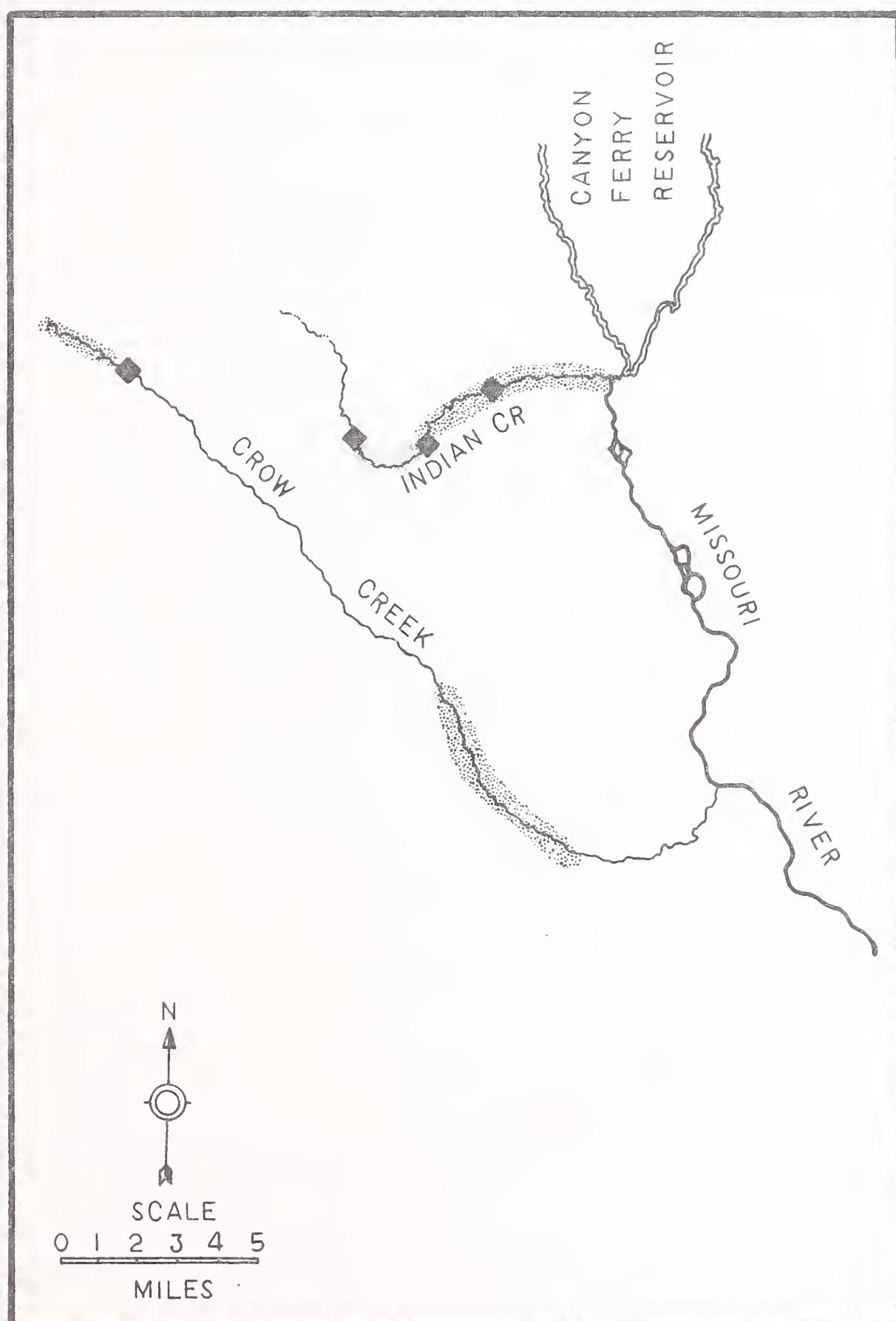


Figure 2. Streams in the Elkhorn Mountains examined during this placer mining survey. Dark Squares indicate existing placer operations; shaded stream reaches showed evidence of historic placer mining.



The MDFWP collected fishery data and fish habitat information on Crow Creek below the National Forest boundary in 1977 and 1982. The U.S. Forest Service collected this information above the National Forest boundary to Crow Creek Falls in 1979 and 1982. In 1977 rainbow trout and mountain whitefish were uncommon in the lower reach between the mouth and Radersburg (7.9 miles). In 1982, above Radersburg to the National Forest boundary (5.4 miles) brook and rainbow trout were common (194 rainbow trout per 300 m), brown trout were rare, and mottled sculpin were abundant.

Above the National Forest boundary to Crow Creek Falls (7.7 miles) brook trout were common and rainbow trout were uncommon (1982). Mottled sculpin were common in the lower 2.8 mile segment of this reach and uncommon in the upper segment. Habitat between the National Forest boundary and Crow Creek falls was deteriorating. In the lower 2.8 mile mining practices have degraded the watershed. In the upper 4.9 miles bank encroachment and channel alterations resulting from mining were degrading the fishery. Natural factors that were also limiting the fishery included poor spawning habitat, inadequate pools, and a lack of undercut banks.

#### Indian Creek

Indian Creek has been extensively placered historically. Gold was first discovered in Indian Creek in 1870, six miles upstream from the mouth (Lyden 1948). Placer deposits in the drainage were worked for 25 years by large-scale operations then sporadically thereafter. From 1940-1942 two companies in the lower reach of the drainage washed more than one million cubic yards of gravel annually.



We examined the lower nine miles of Indian Creek on 9 July 1986. The stream along this entire reach suffers from a combination of abuses from past and present mining activities. Large historic dredge piles line the first four miles of the stream. Above this point deep cuts (50-75 feet deep) and steep headwalls are evident from past hydraulic mining (Photo 21).

A large operation nine miles upstream from the mouth has regularly violated water quality standards over the past three years (Photos 23-24). On the day of our visit muddy water was being illegally discharged into Indian Creek. Existing mine operations are creating steep, erosive headwalls in the drainage. This operation appears to be larger than 5 acres although the operator does not have a state operating permit. A second large operation located further downstream (Photo 22) was cutting headwalls along the streambank for a distance of about 0.5 miles. The operation included one settling pond and a fleet of heavy machinery. This operation also appeared to be larger than 5 acres although the miners are working without a state operating permit.

The MDFWP inventoried fish populations and fish habitat in an upper reach of Indian Creek in 1985. The inventory began 6.1 miles above the mouth and extended upstream 4.3 miles to the National Forest boundary. Brook trout were uncommon throughout the entire reach that was surveyed. Both historic and ongoing mining practices in this drainage are severely limiting the fishery. Over 5 miles of stream have been straightened, relocated or otherwise altered. This was perhaps the most severely damaged drainage that we reviewed during this investigation.



## Placer Mines in the Continental Divide Area

Streams inventoried in the Continental Divide area are shown in Figure 3.

### American Gulch

Placer mining occurred intermittently in American Gulch between 1904 and 1948 and gold recoveries were sparse (Lyden 1948). However, judging by the extent of placer spoils visible in American Gulch, historic mining activity was relatively intense.

The lower reaches of the gulch were examined on the 31 July 1986. Beginning about 0.5 mile upstream from the Finn road, old dredge piles line the streambed and banks for about 1.5 miles. Existing activities included both a placer mine and a hardrock operation near the National Forest boundary. The placer operation, which was not working at the time of the visit, was situated in the middle of the dry streambed.

The streambed has been straightened, dredged, bulldozed and buried by historic and present mining activities. Although these alterations have been severe, the impact of these activities on fish habitat are low because intermittent streamflows prevent establishment of a fishery.

### Carpenter Creek

Gold was first discovered in Carpenter Creek in 1865 (Lyden 1948). In 1868, over 1,200 men were working in Ophir, Carpenter, and Snowshoe Gulches and placer



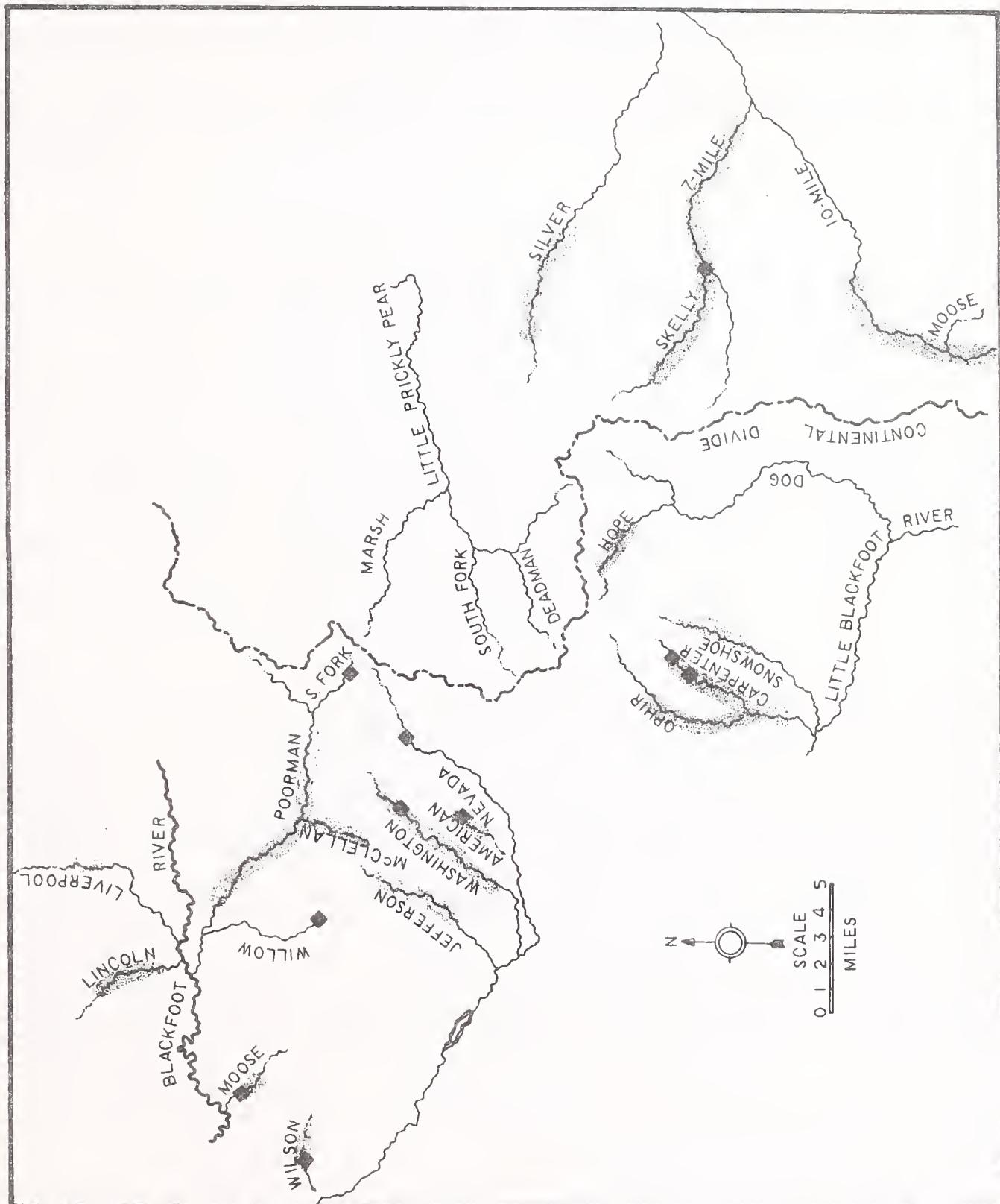


Figure 3. Streams in the Continental Divide examined during this placer mining survey. Dark Squares indicate existing placer operations; shaded stream reaches showed evidence of historic placer mining.



mining was active through 1869 and from 1933 to 1940. Historic placer deposits in Carpenter Creek were numerous and rich. Placer mines worked from the mouth of Carpenter Creek to near the source and in almost all tributaries entering from the west. Additionally, "terrace" or "bench" placers worked the west side of Carpenter Creek.

Portions of Carpenter Creek were inspected from the ground and from the air on the 17 and 30 of July, respectively. Evidence of past mining activity was apparent along the entire stream. The lower three miles of stream is lined with historic dredge piles. The upper reaches were hydraulically mined and have been altered by blasting, tunnelling, and dredging. Small dredge piles and abandoned mining equipment remain in the stream (Photo 26).

We observed two small placer operations reworking historically mined areas. One operation, consisting of a bulldozer and a trommel, was set up to discharge into a small tributary of Carpenter Creek. A downstream operation consisted of several test pits and four small settling ponds. Impacts of present mining activities are relatively minor compared to damage from historic activity. No fishery information was available on Carpenter Creek; however, fishery habitat has been severely degraded due to historic mining.

#### Hope Gulch

Hope Gulch, along with Faith and Charity Gulches, were described as being productive for minerals but no specific information was given (Lyden 1948). We examined nearly the entire stream from the mouth upstream approximately 4.5 miles to Charity Gulch on 31 July 1986. Evidence of historic placer mining was



observed in the upper reach where small dredge piles line the stream for about one mile. Most of these have begun to revegetate and the stream appears to be in good condition. U.S. Forest Service personnel (1986) reported that a placer miner is currently working at the mouth of Charity Gulch; however, we did not observe mining activity in this area.

The MDFWP collected fishery data and fish habitat information on Hope Creek in 1977. The inventoried reach began at the mouth and extended upstream 1.6 miles. There were 23 trout per 300 m in this reach; brook trout were common and west-slope cutthroat trout were uncommon. Mining does not appear to be an important factor in the drainage.

#### Jefferson Creek

Nearly the entire length of Jefferson Creek was historically placer mined either hydraulically or by dredging. Virtually all dredgeable ground was exhausted by 1948 (Lyden 1948).

We examined the lower five miles of stream on 18 July 1986. Steep, unstable headwalls from hydraulic mining continue to erode into the stream. One placer mine that was worked perhaps 20-40 years ago (judging by the machinery) has been abandoned and was not reclaimed (Photo 27). A large pond, dredge piles, and machinery remain at the site.

No fishery information was available on Jefferson Creek. Fishery habitat is severely degraded as a result of previous mining.



### Lincoln Gulch

Gold mining in Lincoln Gulch was historically productive -- supporting a few hundred miners and a small town. Gold was first discovered in the gulch in 1865 and most mining occurred prior to 1871. Mining was again attempted in the early 1900's, including an underground mine in 1904, but these attempts were not productive (Lyden 1948).

We examined Lincoln Gulch on 28 July 1986 from 0.25 mile above the mouth upstream for approximately four miles. The upper two miles of the stream is lined on both sides by historic dredge piles that are largely revegetated. There was no water in the stream at the time of our visit. The only mining activity that we observed was a lode operation located four miles upstream from the mouth.

No fishery information was available on Lincoln Gulch probably because the stream is intermittent and cannot sustain a fishery. Consequently, mining in Lincoln Gulch is not an important factor with respect to fish habitat.

### Little Prickly Pear

We were unable to find written records of historic mining activity in Little Prickly Pear Creek. Similarly, during our inspection on 23 July 1986 of the reach from the Canyon Creek road upstream approximately eight miles to Deadman Creek, we did not see evidence of past placer activity. Old tailings were seen at the mouth of Piegan Gulch, a tributary to Little Prickly Pear; however, no tailings were observed in the mainstem.



This stream is an important spawning tributary for fish in the Missouri River. The MDFWP collected fishery data and fish habitat information on Little Prickly Pear Creek in 1977. In the lower reach, from the mouth to Canyon Creek (26.7 miles) rainbow trout were common (31/300 m) as were brown trout (12/300 m) and mottled sculpin. Brook trout, mountain whitefish, white sucker and longnose sucker were uncommon in this reach. Further upstream, from Canyon Creek to the North and South Forks (approximately 9.5 miles) there were 39 trout per 300 m. Rainbow trout, brook trout and mottled sculpin were common in this reach; brown trout were uncommon.

Fish habitat in both reaches was deteriorated but primarily due to factors other than mining. Neither historic or existing mining were important factors with respect to the fishery.

### Liverpool Creek

Some placer mining occurred in Liverpool Creek prior to 1948 but gold production was low (Lyden 1948). We examined a short segment of Liverpool Creek on 25 July 1986, near the National Forest boundary. The stream was lined with small dredge piles which had been revegetated. Trees established on the gravel piles were as much as 15 feet tall; no existing placer mines were observed. The stream appeared to be recovering from past placer alterations and was in relatively good condition. No fishery information was available for Liverpool Creek; placer mining did not appear to be an important factor with respect to fishery habitat.



### McClellan Creek

McClellan Creek yielded extremely rich deposits of placer gold near the turn of the century (Lyden 1948). We examined the stream from the air on 30 July 1986. The first mile of stream upriver from the mouth resembled a strip mine (Photo 28); steep cuts and dredge piles from historic mining were evident throughout the reach; however, no existing placer operations were present. McClellan Creek is ephemeral and consequently does not support a fishery. However, extensive disturbances from past mining undoubtedly result in increased sediment delivery to Poorman Creek during seasons when McClellan Creek is flowing.

### Moose Creek (Powell County)

The Moose Creek Canyon was said to be too narrow and rough to permit extensive mining although one season of activity was reported in 1909 (Lyden 1948). We examined the lower 0.25 miles of stream on 28 July 1986. Small dredge piles were observed near the mouth of the creek where the Canyon is relatively wide. Most of these had been thickly revegetated and were difficult to discern. Forest Service personnel indicated that a placer operation was present above the mouth of Moose Creek. However we saw no evidence of activity other than a sign bearing the name of a claim. Fishery information was unavailable for Moose Creek. Mining activity did not appear to be an important factor in the drainage.



## Nevada Creek

Placer mining in Nevada Creek yielded substantial quantities of gold in the early 1900's (Lyden 1948). One claim was worked regularly from 1898 to 1946 using primarily hydraulic mining and sluicing (Wolle 1963).

A middle reach, from the National Forest boundary (30 miles from the mouth) upstream for approximately 2.5 miles was inspected on 18 July 1986 and the upper reach, from the headwaters downstream for approximately two miles was examined on 23 July 1986. No evidence of historic placer activity was observed in the reaches that we inspected and no active placer sites were present.

In the upper reach we examined a recently abandoned and reclaimed placer site that had been worked from 1981-83 (Photo 29). Several small dredge piles and a settling pond had not been reclaimed, however, the stream channel had been recontoured to a meandering pattern and appeared quite natural. Some portion of the streambanks had begun to revegetate and overall, the reclamation work appeared to be successful.

The MDFWP collected fishery data and fish habitat information on Nevada Creek in 1977. The inventoried reach began at Nevada Lake (21 miles from the mouth) and extended upstream 15 miles to the headwaters. Cutthroat, rainbow and brown trout were abundant in this reach (47 trout per 300 m) as were large scale and longnose sucker. Fish habitat was judged to be deteriorated but due to factors other than mining. Placer mining was not an important factor in the portions of the drainage that we reviewed.



### Ophir Creek

Ophir Creek, a tributary to Carpenter Creek, was a productive site that was thoroughly worked by sluicing, hydraulic mining and tunneling. One small section of stream had not been worked by 1948 possibly due to the steep topography which made tailings disposal difficult (Lyden 1948) or lack of water required for sluicing (Wolle 1963).

We reviewed a middle segment of the stream (17 July 1986) from the Ophir Creek Road (three miles from the mouth) upstream 2.5 miles to the North Fork. This reach has been greatly altered by past mining activity; large dredge piles line the stream throughout the reach. We did not see evidence of ongoing placer activity during our inspection. Fishery information was not available for Ophir Creek. However, fishery habitat has been severely damaged by historic mining.

### Poorman Creek

Poorman Creek and its tributaries (other than McClellan Creek) were relatively unproductive for gold. These streams were reportedly worked for only ten seasons between 1904 and 1945, 1910 being the most productive year (Lyden 1948).

We examined the majority of the drainage on 23 July 1986. Although historic records do not indicate intensive placer activity, we observed three to four miles of stream below McClellan Creek that had been extensively dredged (Photo 30). Large dredge piles lined both sides of the stream for more than a mile in one stretch, and for 0.5 mile in another. Several recently abandoned operations had been working old dredge piles downstream of McClellan Creek and machinery



had been left near the stream. Signs of historic placer activity were not obvious above the South Fork of Poorman Creek.

Fishery data was collected in Poorman Creek by the MDFWP in 1972 and 1976. Fish habitat information was collected by the MDFWP (1977 and 1985) and by the U.S. Forest Service in 1979. In 1972, from the mouth upstream 5.8 miles to Field's Gulch, westslope cutthroat trout were abundant (216/300 m) as were slimy sculpin. Brook trout and bull trout were common (70/300 m and 8/300 m respectively) along with mountain whitefish while brown trout were rare. From Field's Gulch upstream for 6.7 miles there were 23 trout per 300 m in 1976. Westslope cutthroat trout were abundant, brook trout, mountain whitefish, and slimy sculpin were common, and brown trout were uncommon.

Past mining activities have degraded stream habitat from the mouth to the South Fork tributary (12 miles). Upstream of the National Forest boundary, at least 8000 m of stream channel have been altered by past dredging activity. Mining activities had contributed to bank erosion and dewatering. Below the National Forest boundary dewatering for agriculture is an additional problem. The stream continues to support a significant fishery in spite of severe habitat alterations caused by both historic and recent mining.

#### Silver Creek

Historically Silver Creek was the most productive stream in the Marysville district, producing 75% of the district's gold (Lyden 1948). Gold was first discovered in 1863 and intensive mining began in 1864. No placer activity was reported between 1904 and 1933, but in 1939 and 1940 two miles of the creek were mined.



We reviewed the 3 miles of stream upriver from Canyon Creek Road on 23 July 1986. No existing placer operations were observed although a relatively new mill is located near the mouth of the canyon. This portion of the stream is lined with historic dredge piles (Photos 33-34) and several old settling ponds (Photo 34).

The MDFWP collected fishery data and fish habitat information on an upper reach of Silver Creek in 1977. The reach surveyed began near the Canyon Creek road and extended upstream for 2.1 miles. Upper Missouri cutthroat trout and mottled sculpin were common in this stretch; 12 trout were present per 300 m of stream. Stream dewatering for agriculture and channel alterations from mining and dredging have had a negative influence on the fishery. Additionally, the Montana Fish and Game Commission instituted catch and release fishing regulations in Silver Creek because the fish are contaminated with mercury from past mining activity.

#### Skelly Creek

Skelly Creek was actively placered from 1910-1922 and from 1931-1944 (Lyden 1948). We inspected the mouth of the Creek on 17 July 1986. A placer miner was working the bench above the mouth of the stream with a backhoe. The operator had constructed several well designed settling ponds that were not discharging to the stream. The stream has been significantly altered by historic mining but the present operation is not affecting the stream. No fishery information was available for Skelly Creek, although habitat alterations from historic mining are probably limiting the fishery.



### Snowshoe Creek

Gold was first discovered in Snowshoe Creek in 1865 (Lyden 1948). Bench deposits were worked by sluicing, tunneling, and hydraulic mining and creek deposits were dredged and sluiced. The largest gold nugget ever taken in Montana by placer mining was found in a tributary to Snowshoe Creek. Placer mining was relatively productive in the early 1860's but there has been little placer activity since then.

We inspected the uppermost 6.5 miles of Snowshoe Creek on 31 July 1986. The only evidence of mining activity was observed in a two mile reach upstream from the National Forest boundary which was lined on both sides with unvegetated spoils. No current mining operations were present. For the most part, the stream appeared to be in good condition.

No fishery information on Snowshoe Creek was present in the MDFWP data files; however, the stream is known to support an excellent brown trout fishery. Mining is not an important factor with regard to fishery habitat in Snowshoe Creek.

### South Fork Poorman Creek

According to historical reports, only a small amount of gold was produced in the South Fork of Poorman Creek (Lyden 1948).

We reviewed the entire stream from the headwaters to mouth on 23 July 1986. One small abandoned site was observed where mining debris was left in the stream and



several barren dredge piles were present (Photo 33). An active placer operation was observed in the middle reaches of the South Fork of Poorman Creek (Photo 31). The operator had mined approximately 75 yards of ground immediately adjacent to the creek. Heavy machinery had been used to strip vegetation and a deep settling pond was present (Photo 32). This disturbance was having a minimal influence on the stream.

In 1979 the U.S. Forest Service inventoried fish habitat from the mouth upstream for 1.6 miles. Habitat in this reach was judged to be suitable for trout spawning and rearing, and above average for trout residence. A barrier in this reach limited upstream movement of fish. Overall, mining was a relatively insignificant factor with respect to fishery habitat in the South Fork of Poorman Creek.

#### Washington Creek

Washington Creek was the most profitable and consistently productive stream in the Finn district, Powell County (Lyden 1948). In the late 1860's miners used hand tools to dig a 13 mile ditch from Nevada Creek to divert water for sluicing. Records show that gold production in the Finn district was greatest prior to 1890 but placer activity on Washington Creek continued until 1941. Wolle (1963) reported that historic miners damaged six miles of the creek near the mouth.

We examined four miles of stream near the mouth on 18 July and 5 August 1986. The majority of the stream, with the exception of a one mile stretch on private land, was severely damaged by placer mining. A large patented operation was



observed about five miles upstream from the mouth (Photos 36-38). The disturbance which appeared to be larger than 5 acres extended for about one mile along the stream and included two large settling ponds (that were closed), one road in the stream bottom (Photo 38), and a bench road on each side of the stream. Numerous heavy equipment items were present at the site. A small placer mine that was recently abandoned was also observed in the lower reaches of Washington Creek. Several large dredge piles and an unreclaimed settling pond remained at the site.

No fishery information was available for Washington Creek. However, the fishery potential of the stream has been severely reduced as a result of historic and ongoing mining. Washington Creek is a major producer of sediment to downstream tributaries.

#### Willow Creek

A small amount of historic placer activity is believed to have occurred in Willow Creek (Lyden 1948).

We inspected the first six miles of Willow Creek on 28 July 1986 including portions of the East Fork tributary. No evidence of historic placer activity was observed in either the mainstem or in the East Fork and no current placer activity was present in the mainstem. A small placer operation was observed approximately 0.5 mile up the East Fork. The site included test pits and dredge piles from mining that occurred in the late 1940's and early 1950's. At the time of our inspection the operator was reworking the test pits by hand.



Fishery data and fish habitat information was collected on Willow Creek from its mouth to the East Fork tributary (6.2 miles) in 1978 and the reach from the mouth to the National Forest boundary (five miles) was inventoried in 1985. In 1979 the U.S. Forest Service surveyed the upper reach from the Forest boundary to the East Fork tributary (1.2 miles). In the lower reach, westslope cutthroat trout were abundant (111/300 m) and brook trout were common (11/300 m). Both the East Fork and the mainstem were relatively undisturbed by mining.

### Wilson Creek

We were unable to find written records of historic mining activity in Wilson Creek. We inspected portions of the stream on 31 July 1986. The upper reaches appeared to have been historically mined and were lined with dredge piles on both sides of the creek. A small operation was observed on private land in the lower reaches that included stream diversion and settling pond. However, most of the activity was away from the stream and was having little impact. No fishery information was available for Wilson Creek. Historic mining in the upper reaches has had a negative influence on fish habitat.

### Summary

Our review of placer mining near the Helena National Forest included 34 streams and 21 active placer mining sites. Of the 21 active operations four were very large (employing numerous heavy equipment items and disturbing what appeared to be 5 acres of ground or more), three were large (employing three or more heavy



equipment items, usually including a dragline, and disturbing from 0.5-5 acres of ground), ten were medium sized (employing one or two heavy equipment items, usually a dozer or a backhoe, but disturbing less than 0.5 acres of ground) and four were relatively small (employing small machinery and hand equipment and disturbing less than 0.5 acres).

The 21 active placer sites were located near 18 streams. Eight operations were located directly in perennial streams and six of these were judged to be causing significant damage to fish habitat. Seven operations were present in intermittent streams that have little fishery potential. However, activities in these streams probably result in increased sediment delivery to downstream tributaries during periods of streamflow.

We observed three placer operations that appeared larger than 5 acres and that were not listed as having operating permits from the Department of State Lands. These included two in Indian Creek (photos 22 and 23), and one in Elk Creek (Photo 8).

Seven of the eight instream operations did not have current streambank and streambed preservation permits according to information provided by the Conservation Districts. Four operations were discharging to a stream during our inspection or showed evidence of a previous discharge; two of these did not possess a waste discharge permit from the Department of Health and Environmental Sciences. One mine operation included a settling pond that had failed causing mine water and embankment material to enter the drainage. Fishery habitat had been significantly damaged in 21 streams from historic placer mining. Eleven current operations were judged not to be having a significant impact on fishery resources.



## DISCUSSION

### Laws and Regulations

#### General Mining Law of 1872

The general mining law opens the majority of federal lands to mineral exploration and mining. The law establishes mining as a high priority use of public lands and outlines procedures for staking, patenting and retaining mining claims. A miner may obtain full title to the property on which his claim is located (patenting) if he can demonstrate that a profitable mining operation can be sustained (according to the prudent man test). When a patent is approved, the land is transferred to the miner for only \$5.00/acre for most hardrock claims and \$2.50/acre for placer claims. Once legal title has been conveyed, the Forest Service has no authority over the land.

Patenting of mining claims, while good for the miner, has the secondary negative affect of depriving sportsman access to previously public fishing waters. The patented placer claim located in Crow Creek at the base of Crow Creek Falls is an example of a stream reach that was essentially shut off to public use (Photos 18-20). Although miners who are working patented claims must comply with other state and federal laws that pertain to mining, privatization of mining properties increases the difficulties of conducting inspections and enforcing regulations for some agencies. Revisions in this law should be considered.



## Metal Mine Reclamation Act

The Metal Mine Reclamation Act is a state law administered by the Montana Department of State Lands. The law provides protection to the environment from mining activities by requiring reclamation of the land to a condition of beneficial use. Under this Act, miners are required to obtain an operating permit from the Department and may be required to post a bond in the estimated amount of cost required to complete the reclamation. The operating permit application must include a reclamation plan, a mining plan (including schedules and boundaries), road locations, and other pertinent information.

Mining operations conducted on federal lands are exempt from the state law if the board of land commissioners determines that the federal agency administering the land imposes reclamation controls that are at least as strict as those that would be imposed by the state.

Small miners, defined as operators who move less than 36,500 tons of material per year and whose operations result in not more than 5 acres of the earth's surface being disturbed and unreclaimed, are also exempt from many of the requirements of this law. Small miners are required only to agree (in writing) not to pollute streams, provide for protection and safety of the mine site, and to provide a map of the operation. Additionally, a confidentiality provision in the law prohibits the Department from publicly disclosing the location of small mining claims. Most placer mining operations on the Helena National Forest fall in the small miners category. However, the Helena National Forest staff have a policy of requiring all placer miners to submit operating plans. The rules and



regulations under which the Forest Service operates do not require confidentiality, hence the states confidentiality requirement in the small miners exclusion can be circumvented by the federal agency.

#### Montana Water Quality Act

The Montana Water Quality Act administered by the Water Quality Bureau, Department of Health and Environmental Sciences requires miners to obtain a waste discharge permit if the operation includes the discharge of mine waters to surface or ground water. The law also requires that wastes not be placed in a location where they are likely to cause pollution of state waters. Miners can apply for a permit to temporarily increase stream turbidity during the construction phase of their project provided that the activity is approved by the Montana Department of Fish, Wildlife and Parks.

The primary pollutant associated with placer mining is turbidity which originates from suspended solids. Placer miners usually construct a series of settling ponds to retain wash waters and allow suspended materials to settle out before the water is discharged to a river or stream. The Water Quality Bureau provides placer miners with a settling pond handbook (written by the Alaska Department of Environmental Conservation) that contains design considerations pertaining to settling ponds and provides advice as to the best methods of reducing mine water turbidity.

During our survey we observed several poorly constructed settling ponds, one of which had collapsed into the drainage (Photo 14). Discharge to a stream of turbid water from one placer operation was also noted (Photo 24). We visited



several existing placer operations where loose material left in the floodplain will likely wash into the stream during high water (Photos 2, 8, 27, 32). We also observed numerous instances where spoils piles from historic placer operations, some nearly a 100 years old, continue to erode into streams (Photos 1, 4, 6, 10, 15, 21, 28, 34). Preventing water quality degradation from present day placer mining appears to require better communication between state regulatory agencies and federal land managers who frequent the sites where mining is occurring. An interagency mine oversight committee would probably help facilitate these communications.

#### Montana Streambed and Land Preservation Act

The Streambed and Land Preservation Act (Senate Bill 310) authorizes county Soil and Water Conservation Districts to protect and preserve Montana's rivers and streams and the land immediately adjacent to them. Persons planning projects which will result in channel or bank alterations of any natural perennial stream are required to apply for and obtain a permit from the appropriate district (or where no district exists, from the Board of County Commissioners). Requirements include submission of detailed plans and maps of the project area and an inspection of the project site by representatives of the Conservation District and the Department of Fish, Wildlife and Parks. Conservation Districts also have the authority to require revegetation and reclamation plans and to impose reclamation bonds.

The use of bonding authority by the various Conservation Districts represented on the Helena National Forest varied. For example, the Meagher County Conservation District routinely required reclamation bonds from placer miners whereas



other districts rarely used their bonding authority. In some cases miners had been required to post bonds with both the Conservation District and the Forest Service.

Several district representatives expressed the opinion that the permitting process for most of the smaller mining operations was pointless because follow-up inspections were seldom conducted. Further, some districts felt that they lacked the technical expertise to make recommendations in some instances. We observed a great deal of subjectivity as to how mining effects on streams was treated on the various districts. Achievement of consistency between districts appears to require some type of coordinated oversight -- perhaps as would be provided by an interagency mining review committee. There also appears to be a need for technical training of district personnel. Such training could be coordinated by an interagency mining review committee.

#### Forest Service Regulations

Several laws give the Forest Service guidance pertaining to mining activities on its lands. The General Mining Law of 1872 opens federal lands to the exploration of minerals and mining and the Mining and Mineral Policy Act of 1970 establishes that mineral development of public lands is to be encouraged by the Federal Government.

Several other laws regulate how mining is conducted and provide for the protection of surface resources which may be damaged by mining. The Organic Administration Act of 1897 requires that miners on National Forest lands comply



with other Forest Service regulations. This commitment is further defined in the Federal Land Policy and Management Act of 1977. The National Environmental Policy Act of 1969 requires that an analysis be completed of the effects of the activity on the environment and that environmental concerns must be considered in planning the activity. The National Forest Management Act (1976) stipulates that fish and wildlife concerns be considered in land management planning and prohibits management activities that will adversely affect water quality or fish habitat.

Existing Forest Service regulations require persons who are planning to mine National Forest lands to file a "notice of intent" with the appropriate ranger district. Activities that will result in a significant disturbance of surface resources require that a plan of operation be submitted for approval. Plans of operation for mining must include information describing the timeframe of the activity, the methods used, the locations of roads and access routes, the operational boundaries, and a reclamation plan. The Forest Service has the authority to require that a bond be posted in the amount of the anticipated cost of the reclamation.

Most of the placer mines that were reviewed on Helena National Forest lands were operating under the guidelines set forth in the Forest Service operating permit. The operating permit application form used by the Forest Service requires miners to list other permits he has applied for and received and reminds the applicant of the need for waste discharge and stream protection permits. The Forest Service also provides miners with the forms necessary to apply for a small miners exclusion with the Montana Department of State Lands.



For the most part we felt that the Helena National Forest did a good job of overseeing mining on the Forest. However, there were instances where both the Forest Service and the Conservation District had required bonding of the same operation. The biggest problem appeared to be that Forest Service operating permits are often approved before state agency permits, such as waste discharge permits, are obtained by the operator. We feel that all appropriate permitting should be completed before approval of the federal operating permit. An inter-agency oversight committee would help promote interagency coordination and a better understanding of the roles of various agencies in regulating mining.

#### Bureau of Land Management Regulations

Most of the federal laws that regulate mining on National Forest lands also apply on Bureau of Land Management (BLM) holdings. However, the agency regulations governing mining on BLM lands are different from those of the Forest Service. For example, the BLM requires operating plans for activities under 5 acres only after non-compliance with regulations has been documented. For operations greater than 5 acres, the BLM relies on the Montana Department of State Lands to require an operating plan. The coordination details between the two agencies are outlined in a memorandum of understanding. Additionally, the BLM regulations do not require miners to post a bond; however, we understand that Congress is presently contemplating a bonding requirement on BLM lands.

Inconsistencies as to how mining activities are handled between the two federal agencies and between administrative districts within one agency complicates the coordination efforts with state regulatory agencies.



Only two of the placer operations that we reviewed were located on BLM administered lands. Both operations appeared to be larger than five acres and neither had been required to obtain an operating permit from the Department of State Lands. Additionally, one of these operations was discharging waste water that had not been properly treated. Although agencies are attempting to coordinate with each other, there are obviously breakdowns in communication that prevent surface resources from being protected. Clearly, there is room for improvement.



## Recommendations

- (1) The permitting process is to some extent burdensome to the miner in that permits must be obtained from as many as four state agencies, one federal agency, and one entity of local government. While most of the agencies involved attempt to remind the applicant of the obligations to other agencies, there is presently no mechanism for consolidating the review process nor for ensuring that all permit obligations are met. Agencies often deal with the applicant independently and without the benefit of knowledge gained about the operations by individuals in other agencies. For example, one agency may have good reason for delaying the issuance of a permit while another agency is continuing to move forward. A more coordinated permitting process, either a multiple agency permit or an interagency permit committee, would reduce subjectivity and duplication of effort, improve interagency communication, and provide for more effective regulation of problems. Such a system would also clarify the responsibility of the miner in the permitting process and would hopefully improve the relationship between miners and regulatory agencies. This system is presently being used by other states, such as Alaska, where placer mining commonly occurs.
- (2) Subjectivity and lack of consistency between administrative districts was observed to be a problem for most of the agencies involved in regulation of mining. While this can never be completely overcome some form of centralized oversight of the regulatory process would eliminate most inconsistencies and improve interagency communication.



- (3) Several of the agencies involved with regulating mining practices lack the manpower and budgets to conduct frequent inspections of mining activities. Additionally, agencies such as the Department of State Lands and the Department of Health and Environmental Sciences are largely centralized and are often large distances away from permitted activities. Decentralization would eliminate some of the problems associated with distance and would allow agencies to be more responsive to public complaints and to conduct more frequent routine inspections.
- (4) The disclosure confidentiality clause that applies to the Montana Department of State Lands in their treatment of small miners is circumvented for mining that occurs on federally owned lands because confidentiality is not required of the federal agencies. On non-federal lands confidentiality prevents other state regulatory agencies from determining if miners are in compliance with other laws such as those that relate to water quality. Revisions in this section of the Montana Metal Mine Reclamation Act should be considered.
- (5) The exclusion under state law of small miners from reclamation requirements is also inconsistent because federal agencies often require small miners to perform reclamation and to submit operating plans. Soil and Water Conservation Districts also have the authority to require small miners to post bonds if the activity is located in the stream corridor. Land reclamation requirements are designed to minimize damage to surface resources and to restore the land to its previous condition. Many small mines are located in streambottom or riparian areas which are extremely productive for both fisheries and wildlife. These areas should be reclaimed regardless of the



size of the mine. The small miners exclusion should probably be modified both to prevent damage to other valuable resources and also to provide for consistency between state law and federal and local agency requirements.

- (6) Bonding of mining operations by more than one government entity is not fair to the miner. Centralized oversight and review of proposed mining activities would provide a forum for eliminating this impropriety.
- (7) Many Conservation District representatives feel that they lack the expertise to make recommendations needed to mitigate impacts of mining on streams. Training courses for Conservation District personnel should be considered.
- (8) The provision of the 1872 mining law that allows for patenting of mining claims and the subsequent transfer of title of public lands to private ownership needs to be re-evaluated. Often times these lands are located in or adjacent to streams and represent some of the most productive fish and wildlife lands in public ownership. Patenting effectively removes these areas from public use. In some instances surface resources are more valuable than the minerals that are being exploited. A mechanism should be developed for identifying highly valuable surface resources and for excluding these from subsurface exploitation.

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#### REFERENCES

Lyden, C.J., 1948. The gold placers of Montana. Memoir No. 46, Montana School of Mines, Butte, Montana, 152 p.

Pedersen, D., 1986. Personal files and communications. Water Quality Bureau, Department of Health and Environmental Sciences, Helena, MT.

Wolle, M.V.S., 1963. Montana pay dirt; a guide to the mining camps of the treasure state. Sage Books, Denver, Colorado, 436 p.

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## APPENDICES



## APPENDIX A. Photographs of placer mines in the Big Belt Mountains.



Photo 1. Historic dredge piles along Avalanche Creek (8 July 1986).



Photo 2. Existing placer operation in Avalanche Gulch. Note the erosion from a discharge below the wash equipment. The stream was impounded to provide a pool for a submersible pump (8 July 1986).



## APPENDIX A (Continued).



Photo 3. Dredge piles from an existing placer mine near the head of Beaver Creek (15 July 1986).



## APPENDIX A (Continued).



Photo 4. Old dredge piles along Benton Gulch; the stream was dry when the photo was taken (9 July 1986).



Photo 5. A small placer operation in Benton Gulch; the operator had been working the site for 3 years (30 July 1986).



## APPENDIX A (Continued).

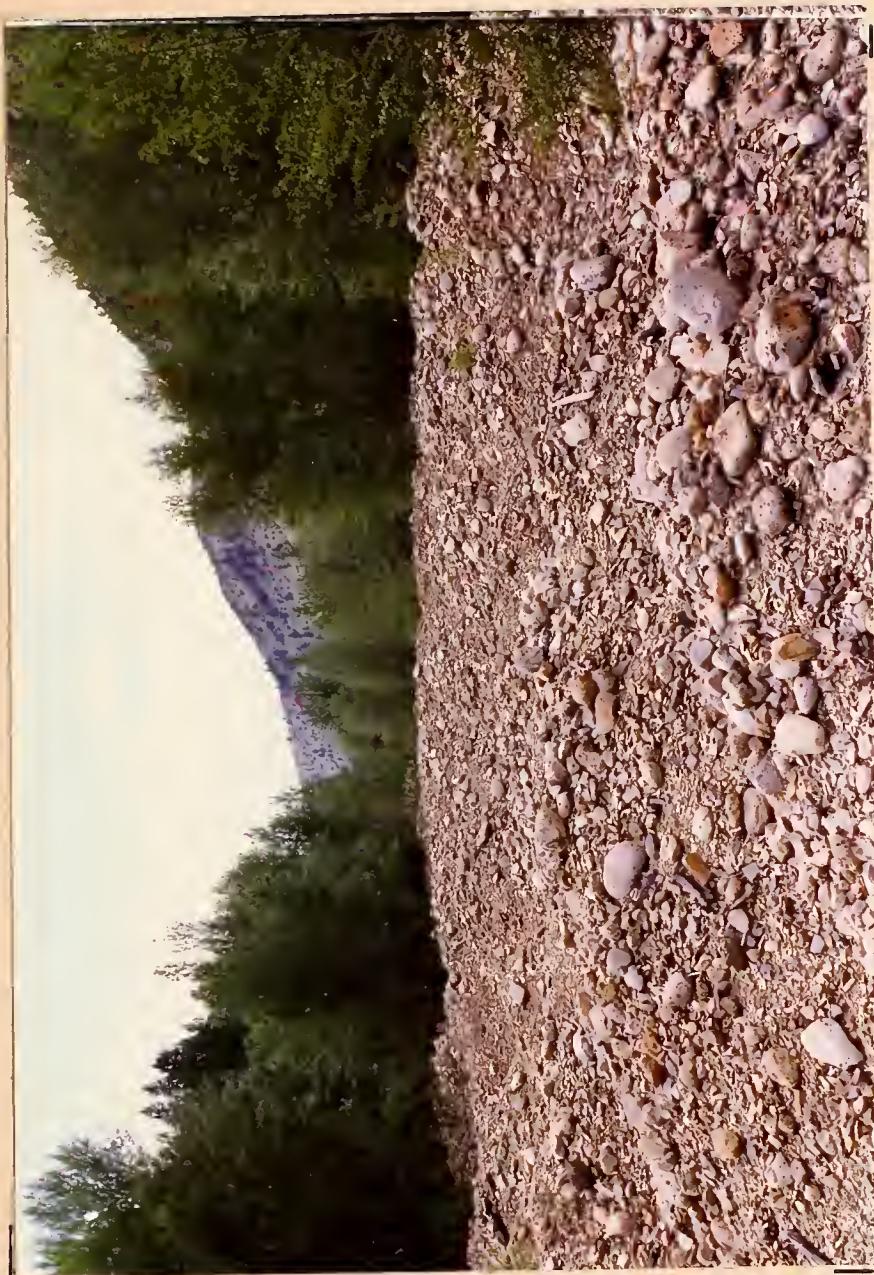


Photo 7. Close view of the historic dredge piles in Confederate Gulch  
(9 July 1986).

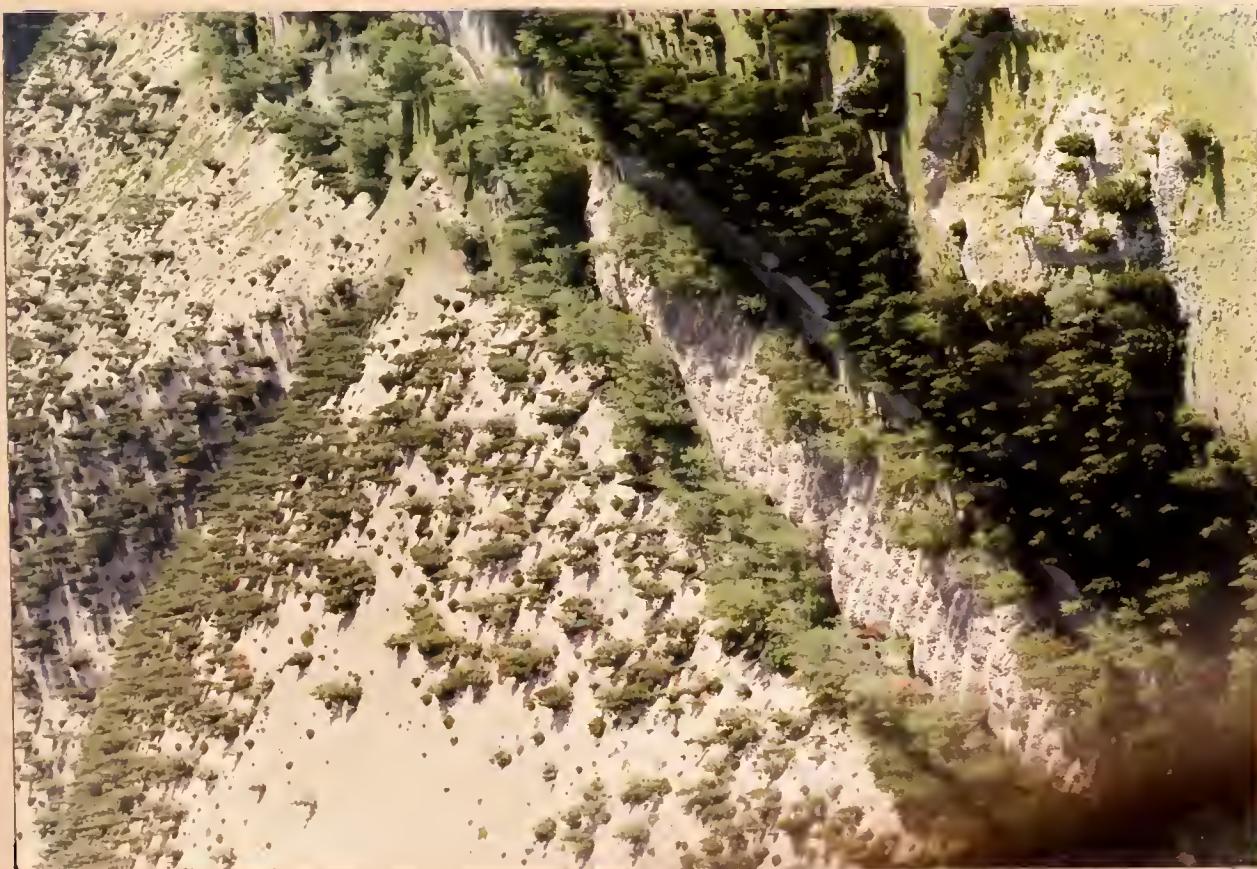


Photo 6. Historic dredge piles in Confederate Gulch  
(30 July 1986).



## APPENDIX A (Continued).



Photo 9. Settling pond for one of the placer operations on Elk Creek; the creek is immediately behind the pond (15 July 1986).



Photo 8. A large placer mine on Elk Creek (30 July 1986).



## APPENDIX A (Continued).



Photo 10. Historic dredge piles on Little Camas Creek (5 August 1986).



Photo 11. Reworking historic dredge piles on Little Camas Creek (5 August 1986).



## APPENDIX A (Continued).



Photo 13. Further disturbance caused by bulldozing in Thompson Creek  
(5 August 1986).



Photo 12. Disturbed streambed of Thompson Creek  
caused by bulldozing and placer dredging  
(5 August 1986).



## APPENDIX A (Continued).



Photo 14. Settling ponds on Thompson Gulch; note that the pond walls have breached and are slumping into the stream (5 August 1986).

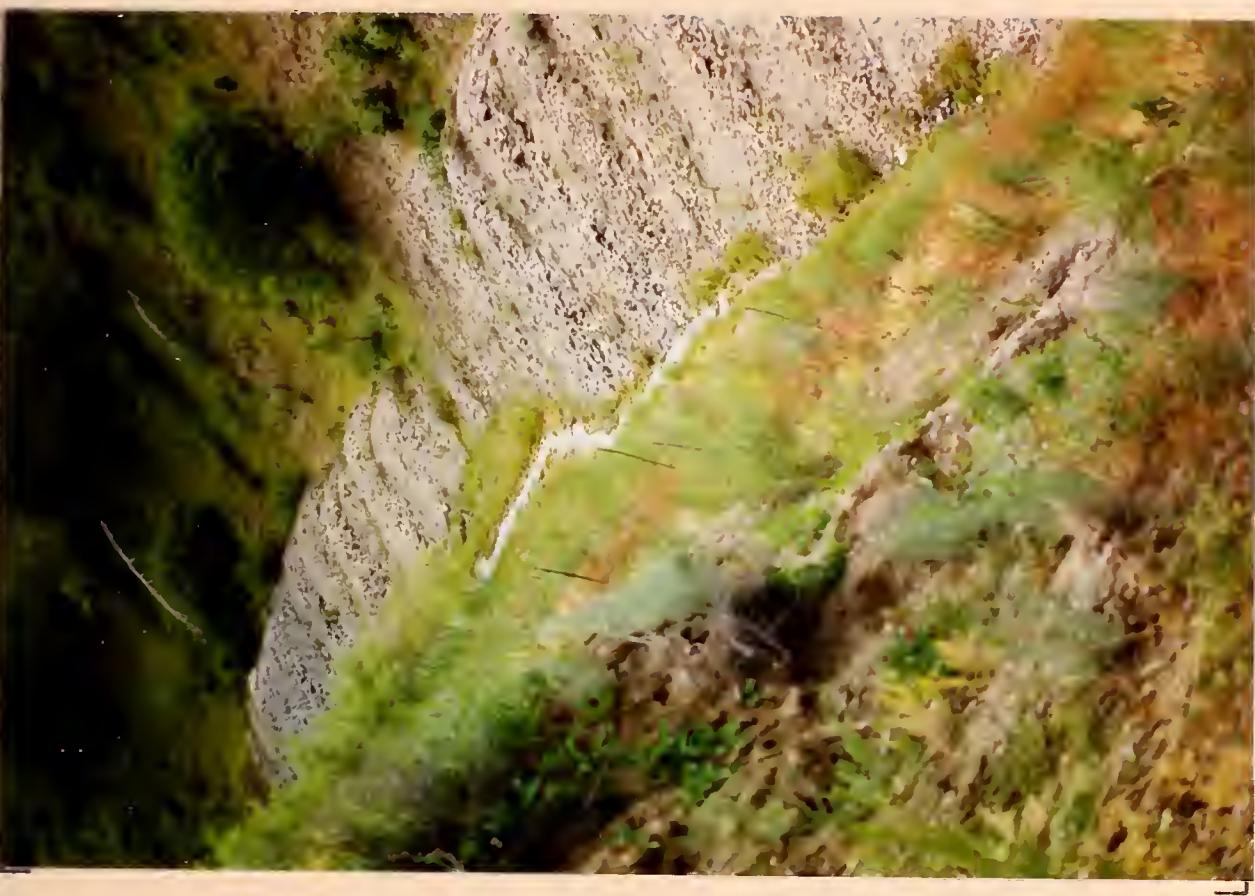


Photo 15. Historic dredge piles on White Gulch. The photo was taken from the top of another dredge pile (9 July 1986).



## APPENDIX A (Continued).



Photo 16. Small placer operation on the bench above White Gulch (9 July 1986).



Photo 17. In-stream road construction activities in White Gulch to gain access to a placer mine (5 August 1986).



## APPENDIX B. Photographs of placer mines in the Elkhorn Mountains.



Photo 19. Machinery and unreclaimed dredge piles from an abandoned placer operation at the base of Crow Creek Falls (21 July 1986).



Photo 18. Boundary of patented placer claim at the base of Crow Creek Falls (21 July 1986).



## APPENDIX B (Continued).



Photo 20. Crow Creek Falls and the abandoned placer operation  
(21 July 1986).



## APPENDIX B (Continued).



Photo 21. Historic dredge piles slumping into Indian Creek (9 July 1986).



Photo 22. An existing placer operation on the bench above Indian Creek (9 July 1986).



## APPENDIX B (Continued).



Photo 24. Turbid water entering Indian Creek from a placer settling pond; this discharge violated state water quality standards (9 July 1986).



Photo 23. An existing placer operation in the upper reaches of Indian Creek (30 July 1986).



## APPENDIX C. Photographs of placer mines in the Continental Divide Area.



Photo 26. Debris and equipment left in Carpenter Creek from a previous placer operation (17 July 1986).



Photo 25. Current placer operation in the dry streambed of American Gulch (31 July 1986).



## APPENDIX C (Continued).

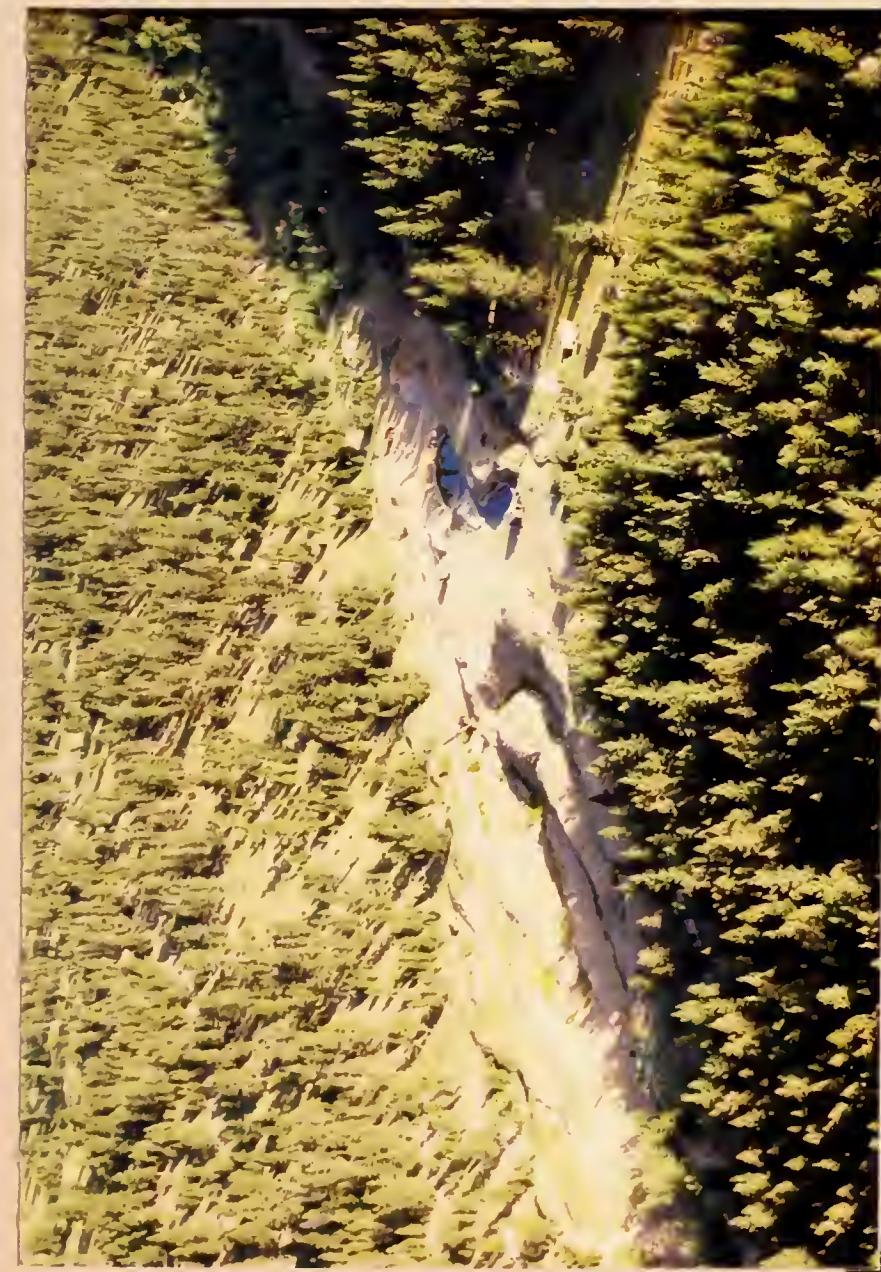


Photo 27. An abandoned and unclaimed placer mine on Jefferson Creek (30 July 1986).



Photo 28. Historic dredge piles on McClellan Creek (30 July 1986).



## APPENDIX C (Continued).



Photo 30. Revegetated dredge piles on Poorman Creek (30 July 1986).

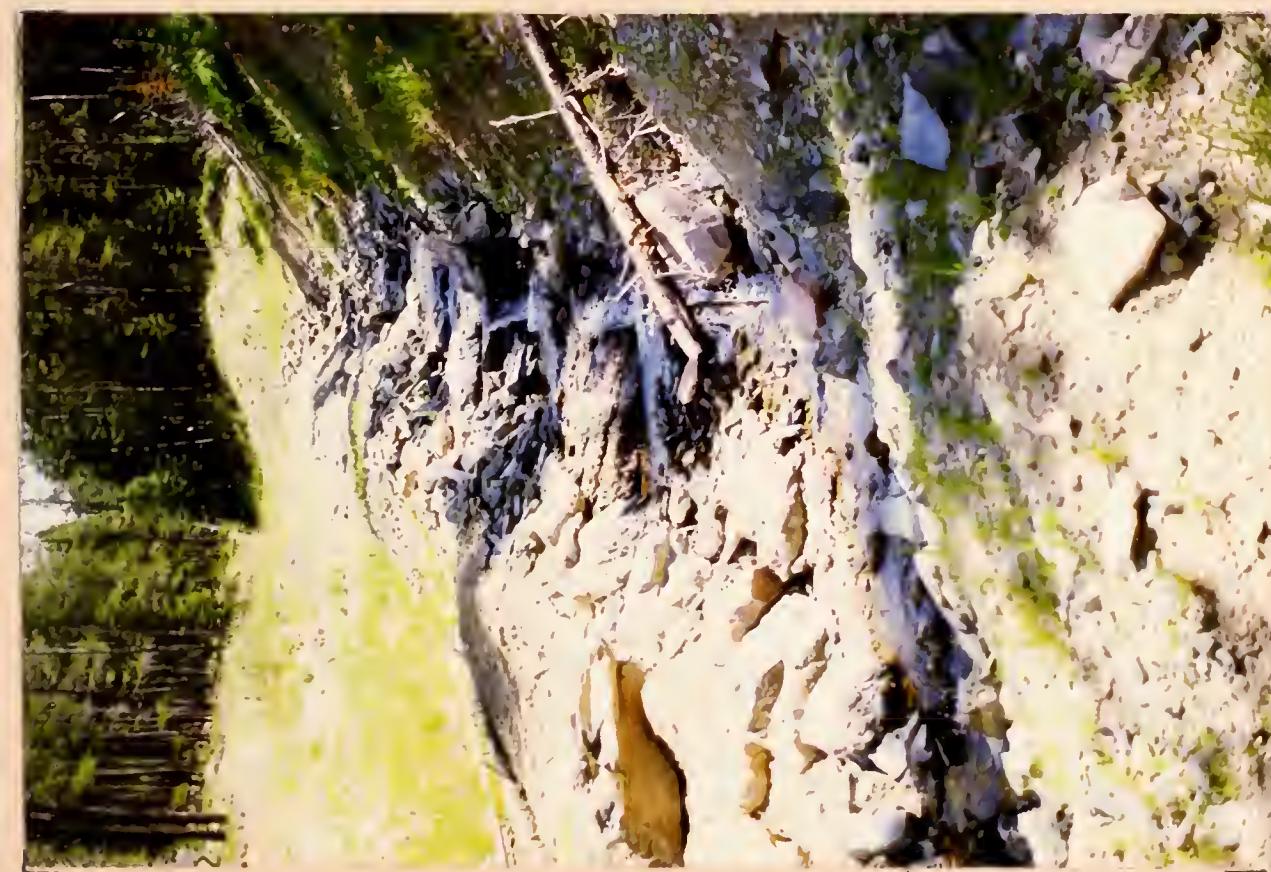


Photo 29. A reclaimed placer site on Nevada Creek (23 July 1986).



## APPENDIX C (Continued).



Photo 31. Placer operation on the South Fork of Poorman Creek. The creek flows behind the machinery and gravel piles (23 July 1986).



Photo 32. South Fork of Poorman Creek. Placer wash water being diverted from the stream which is behind the gravel piles (23 July 1986).



## APPENDIX C (Continued).



Photo 34. Cyanide leach piles, settling pond, and old dredge piles along Silver Creek (30 July 1986).



Photo 33. Debris and equipment left in the South Fork of Poorman Creek from previous placer activity (23 July 1986).



## APPENDIX C (Continued).

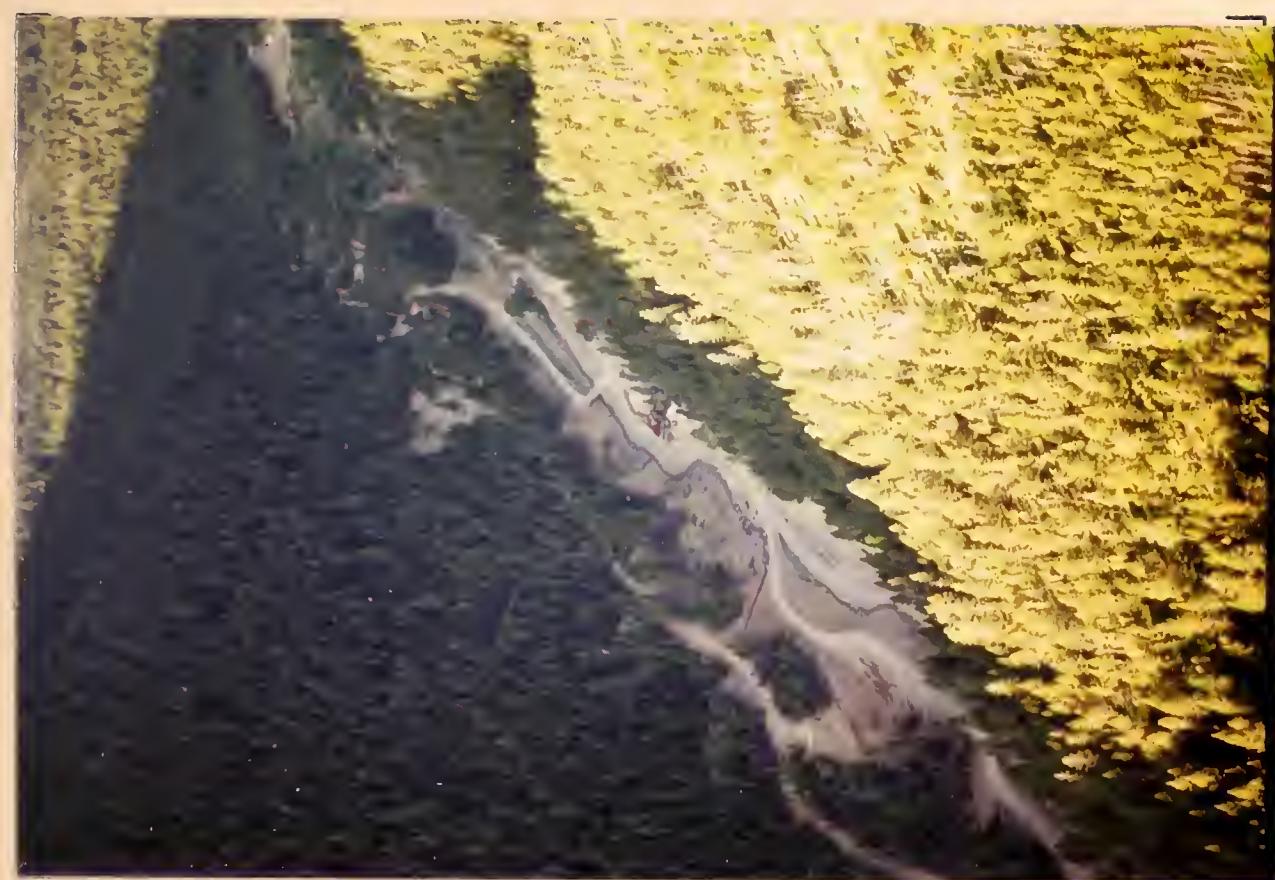


Photo 36. A patented placer operation in Washington Creek (30 July 1986).

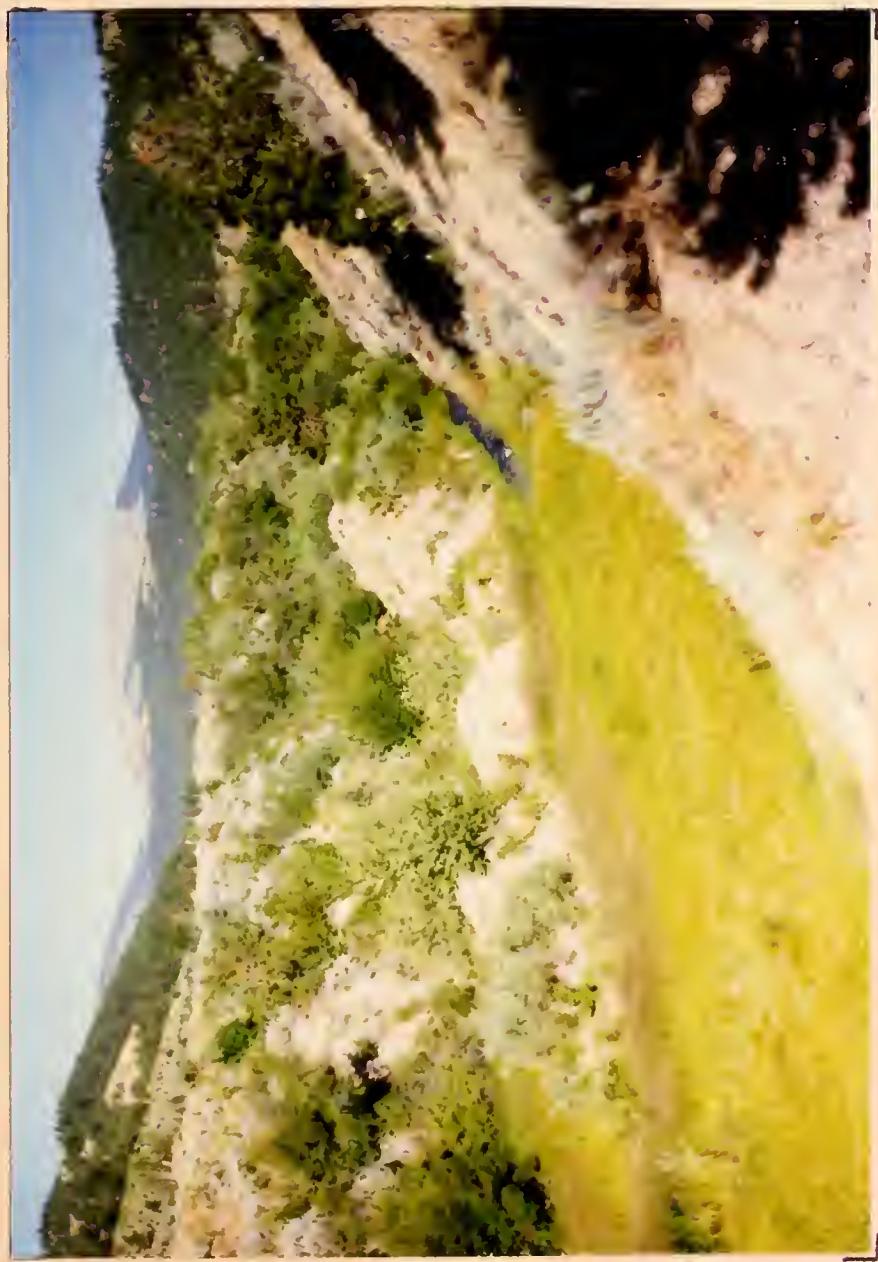


Photo 35. Old dredge piles along Silver Creek (23 July 1986).



## APPENDIX C (Continued).



Photo 38. Channelization of Washington Creek caused by roads built to access a placer mine (18 July 1986).



Photo 37. A large trommel operating near Washington Creek; the creek is in the foreground (18 July 1986).





